

Intel® Desktop Board DQ45CB Specification Update

May 2010

Order Number: E53961-006US

The Intel® Desktop Board DQ45CB may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are documented in this Specification Update.

Revision History

| Revision | Revision History | Date |
|----------|---|----------------|
| -001 | This document is the first Specification Update for the Intel® Desktop Board DQ45CB | September 2008 |
| -002 | Updated the Specification Changes Section | October 2008 |
| -003 | Update to the General Information Section | January 2009 |
| -004 | Updated the Specification Changes Section | April 2009 |
| -005 | Updated the Specification Changes Section | July 2009 |
| -006 | Updated the General Information Section | May 2010 |

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The Intel® Desktop Board DQ45CB may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

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Specification Update for the Intel® Desktop Board DQ45CB

This document is an update to the specifications contained in the *Intel® Desktop Board DQ45CB Technical Product Specification* (Order Number E42785). It is intended for hardware system manufacturers and software developers of applications, operating systems, or tools. It will contain Specification Changes, Errata, Specification Clarifications, and Documentation Changes.

For specification updates concerning the Intel processor that may apply to this desktop board, refer to the following:

- *Intel® Core™2 Extreme Processor QX9650 and Intel® Core™2 Quad Processor Q9000 Series Specification Update* (Order Number 318727)
- *Intel® Core™2 Extreme Quad-Core Processor QX6000 Sequence and Intel® Core™2 Quad Processor Q6000 Sequence Specification Update* (Order Number 315593)
- *Intel® Core™2 Duo Processor E8000 and E7000 Series Datasheet* (Order Number 318733)
- *Intel® Core™2 Extreme Processor X6800 and Intel® Core™2 Duo Desktop Processor E6000 and E4000 Sequence Specification Update* (Order Number 313279)
- *Intel® Pentium® Dual-Core Desktop Processor E2000 Sequence Specification Update* (Order Number 316982)
- *Intel® Celeron® Dual-Core Processor E1000 Series Specification Update* (Order Number 318925)
- *Intel® Celeron® Processor 400 Sequence Specification Update* (Order Number 316964)
- *Intel® Xeon® Desktop Processor 3300 Series Datasheet* (Order Number 319007)
- *Intel® Xeon® Desktop Processor 3200 Series Datasheet* (Order Number 316134)
- *Intel® Xeon® Desktop Processor E3110 Series Datasheet* (Order Number 319006)
- *Intel® Xeon® Desktop Processor 3000 Series Datasheet* (Order Number 314916)

Unless otherwise noted in this document, it should be assumed that any processor errata for a given stepping are applicable to the Altered Assembly (AA) revision(s) associated with that stepping.

Refer to the *Intel® 4 Series Chipset Family Specification Update* (Order Number 319971) for specification updates concerning the 82Q45 GMCH Controller and that may apply to the desktop board DQ45CB. Unless otherwise noted in this document, it should be assumed that any MCH errata for a given stepping are applicable to the Altered Assembly (AA) revision(s) associated with that stepping.

Refer to the *Intel® I/O Controller Hub 10 (ICH10) Family Specification Update* (Order Number 319974) for specification updates concerning the I/O Controller Hub and that may apply to the desktop board DQ45CB. Unless otherwise noted in this document, it should be assumed that any ICH10DO errata for a given stepping are applicable to the Altered Assembly (AA) revision(s) associated with that stepping.

Terminology

Specification Changes are modifications to the current published specifications. These changes will be incorporated in the next release of the specifications.

Errata are design defects or errors. Characterized errata may cause the desktop board behavior to deviate from published specifications. Hardware and software designed to be used with any given Altered Assembly (AA) and BIOS revision level must assume that all errata documented for that AA and BIOS revision level are present on all desktop boards.

Specification Clarifications describe a specification in greater detail or further highlight a specification's impact to a complex design situation. These clarifications will be incorporated in the next release of the specifications.

Documentation Changes include typos, errors, or omissions from the current published specifications. These changes will be incorporated in the next release of the specifications.

General Information

Basic Desktop Board DQ45CB Identification Information

| AA Revision | BIOS Revision | Notes |
|-------------|-------------------|-------|
| E30148-204 | CBQ4510H.86A.0051 | 1,2 |
| E30148-205 | CBQ4510H.86A.0059 | 1,2 |
| E30148-206 | CBQ4510H.86A.0063 | 1,2 |
| E30148-301 | CBQ4510H.86A.0107 | 1,2 |
| E30148-302 | CBQ4510H.86A.0119 | 1,2 |

Notes:

1. The AA number is found on a small label on the component side of the board.
2. The Q45 Chipset kit used on this AA revision consists of two components as follows:

| Device | Stepping | S-Spec Numbers |
|----------|----------|----------------|
| 82Q45 | A3 | SLB8A |
| 82801JDO | B0 | SLG8U |

Summary of Changes

The following table indicates the Specification Changes, Errata, Specification Clarifications, or Documentation Changes that apply to the Intel® Desktop Board DQ45CB. Intel intends to fix some of the errata in a future revision of the desktop board, and to account for the other outstanding issues through documentation or specification changes as noted.

The following notations are used in the table:

| | |
|----------|---|
| Doc: | Document change or update that will be implemented. |
| PlanFix: | This erratum may be fixed in a future revision of the desktop board, driver, or BIOS. |
| Fixed: | This erratum has been previously fixed. |
| NoFix: | There are no plans to fix this erratum. |
| Shaded: | This erratum is either new or modified from the previous version of the document. |

| No. | Plans | Specification Changes |
|-----|-------|--|
| 1 | Doc | Information was added to Section 2.6 Thermal Considerations of the Technical Product Specification. |
| 2 | Doc | Update to the BIOS Setup Configuration Jumper Settings table in the Technical Product Specification. |
| 3 | Doc | Updated Section 3.6.1 Language Support in the Technical Product Specification. |
| 4 | Doc | Support for up to 8 GB system memory has been changed to support for up to 16 GB system memory. |
| No. | Plans | Errata |
| | | There is no characterized erratum for this product |

Specification Changes

The Specification Changes listed in this section apply to the *Intel® Desktop Board DQ45CB Technical Product Specification* (Order Number E42785).

1. Information was added to Section 2.6 Thermal Considerations of the Technical Product Specification. This includes a new Caution statement, changes to the *Thermal Considerations for Components* table, as well as lead-in text and a new table, *Tcontrol Values for Components*.

2.6 Thermal Considerations



CAUTION

A chassis with a maximum internal ambient temperature of 38 °C at the processor fan inlet is a requirement. Intel recommends the use of a Thermally Advantaged Chassis (TAC) for this desktop board. Use a processor heat sink that provides omni-directional airflow to maintain required airflow across the processor voltage regulator area. For a list of Thermally Advantaged Chassis (TAC) please refer to the following website:

<http://www.intel.com/go/chassis>

Table 29 provides maximum case temperatures for the board components that are sensitive to thermal changes. The operating temperature, current load, or operating frequency could affect case temperatures. Maximum case temperatures are important when considering proper airflow to cool the board.

Table 29. Thermal Considerations for Components

| Component | Maximum Case Temperature |
|---------------------------|--|
| Processor | For processor case temperature, see processor datasheets and processor specification updates |
| Intel Q45 Express Chipset | 105 °C |
| Intel 82801JDO (ICH10DO) | 106 °C |

To ensure functionality and reliability, the component is specified for proper operation when Case Temperature is maintained at or below the maximum temperature listed in Table 29. This is a requirement for sustained power dissipation equal to Thermal Design Power (TDP is specified as the maximum sustainable power to be dissipated by the components). When the component is dissipating less than TDP, the case temperature should be below the Maximum Case Temperature. The surface temperature at the geometric center of the component corresponds to Case Temperature.

It is important to note that the temperature measurement in the system BIOS is a value reported by embedded thermal sensors in the components and does not directly correspond to the Maximum Case Temperature. Intel® Quiet System Technology (Intel® QST) monitors the embedded thermal sensor for system fan speed control. The upper operating limit when monitoring this thermal sensor is Tcontrol.


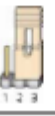

Table 30. Tcontrol Values for Components

| Component | Tcontrol |
|---------------------------|--|
| Processor | For processor Tcontrol, see processor datasheets and processor specification updates |
| Intel Q45 Express Chipset | 99 °C |
| Intel 82801JDO (ICH10DO) | 111 °C |

For more information regarding Thermal Design Guidelines please refer to:
<http://developer.intel.com/Products/Desktop/Chipsets/Q45/Q45-techdocs.htm>

2. Update to the BIOS Setup Configuration Jumper Settings table in Section 2.6 of the Technical Product Specification.

Table 26. BIOS Setup Configuration Jumper Settings

| Function/Mode | Jumper Setting | | Configuration |
|---------------|----------------|---|---|
| Normal | 1-2 |  | The BIOS uses current configuration information and passwords for booting. |
| Configure | 2-3 |  | After the POST runs, Setup runs automatically. The maintenance menu is displayed. |
| Recovery | None |  | The BIOS attempts to recover the BIOS configuration. See Section 3.7 for more information on BIOS recovery. |

3. Updated Section 3.6.1 Language Support in the Technical Product Specification.

3.6.1 Language Support

The BIOS Setup program and help messages are supported in US English, French, Spanish, and German.

4. Support for up to 8 GB system memory has been changed to support for up to 16 GB system memory. Partial section of table 1 shown below.

Table 1. Feature Summary

| | |
|--------------------|--|
| Form Factor | Micro-ATX (9.60 inches by 9.60 inches [243.84 millimeters by 243.84 millimeters]) |
| Processor | Support for the following: <ul style="list-style-type: none">• Intel® Core™2 Quad processor in an LGA775 socket• Intel® Core™2 Duo processor in an LGA775 socket• Intel® Pentium® Dual-Core processor in an LGA775 socket• Intel® Celeron® Dual-Core processor in an LGA775 socket• Intel® Celeron® processor 400 Sequence in an LGA775 socket |
| Memory | <ul style="list-style-type: none">• Four 240-pin DDR2 SDRAM Dual Inline Memory Module (DIMM) sockets• Support for DDR2 800 MHz or DDR2 667 MHz DIMMs• Support for up to 16 GB of system memory using DDR2 800 MHz or DDR2 667 MHz DIMMs |

1.5 System Memory

The board has four DIMM sockets and support the following memory features:

- 1.8 V DDR2 SDRAM DIMMs with gold plated contacts, with the option to raise the voltage to support higher performance DDR2 SDRAM DIMMs
- Dual channel interleaved mode support
- Unbuffered, single-sided or double-sided DIMMs with the following restriction:
Double-sided DIMMs with x16 organization are not supported.
- 16 GB maximum total system memory using DDR2 800 MHz or DDR2 667 MHz DIMMs; refer to Section 2.1.1 on page 45 for information on the total amount of addressable memory.
- Minimum recommended total system memory: 512 MB
- Non-ECC DIMMs
- Serial Presence Detect
- DDR2 800 MHz or DDR2 667 MHz SDRAM DIMMs
- DDR2 667 MHz DIMMs with SPD timings of only 5-5-5 (tCL-tRCD-tRP)
- DDR2 800 MHz DIMMs with SPD timings of only 5-5-5 or 6-6-6 (tCL-tRCD-tRP)



NOTE

To be fully compliant with all applicable DDR SDRAM memory specifications, the board should be populated with DIMMs that support the Serial Presence Detect (SPD) data structure. This allows the BIOS to read the SPD data and program the chipset to accurately configure memory settings for optimum performance. If non-SPD memory is installed, the BIOS will attempt to correctly configure the memory settings, but performance and reliability may be impacted or the DIMMs may not function under the determined frequency.

Table 3. Supported Memory Configurations

| DIMM Type | SDRAM Technology | Smallest usable DIMM (one x16 Single-sided DIMM) | Largest usable DIMM (one x8 Double-sided DIMM) | Maximum capacity with four identical x8 Double-sided DIMMs |
|------------------|-------------------------|---|---|---|
| DDR2 667 | 512 Mbit | 256 MB | 1 GB | 4 GB |
| DDR2 667 | 1 Gbit | 512 MB | 2 GB | 8 GB |
| DDR2 667 | 2 Gbit | 1 GB | 4 GB | 16 GB |
| DDR2 800 | 512 Mbit | 256 MB | 1 GB | 4 GB |
| DDR2 800 | 1 Gbit | 512 MB | 2 GB | 8 GB |
| DDR2 800 | 2 Gbit | 1 GB | 4 GB | 16 GB |

2.1.1 Addressable Memory

The board utilizes 16 GB of addressable system memory. Typically the address space that is allocated for PCI Conventional bus add-in cards, PCI Express configuration space, BIOS (SPI Flash), and chipset overhead resides above the top of DRAM (total system memory). On a system that has 16 GB of system memory installed, it is not possible to use all of the installed memory due to system address space being allocated for other system critical functions. These functions include the following:

- BIOS/ SPI Flash (32 Mbits)
- Local APIC (19 MB)
- Direct Media Interface (40 MB)
- Front side bus interrupts (17 MB)
- PCI Express configuration space (256 MB)
- GMCH base address registers, internal graphics ranges, PCI Express ports (up to 512 MB)
- Memory-mapped I/O that is dynamically allocated for PCI Conventional and PCI Express add-in cards
- Base graphics memory support (1 MB or 8 MB)
- Intel® Management Engine Interface (Intel® MEI) single channel (8 MB) or dual channel (16 MB)

The amount of installed memory that can be used will vary based on add-in cards, BIOS settings, and operating system installed. Figure 8 shows a schematic of the system memory map. All installed system memory can be used when there is no overlap of system addresses.

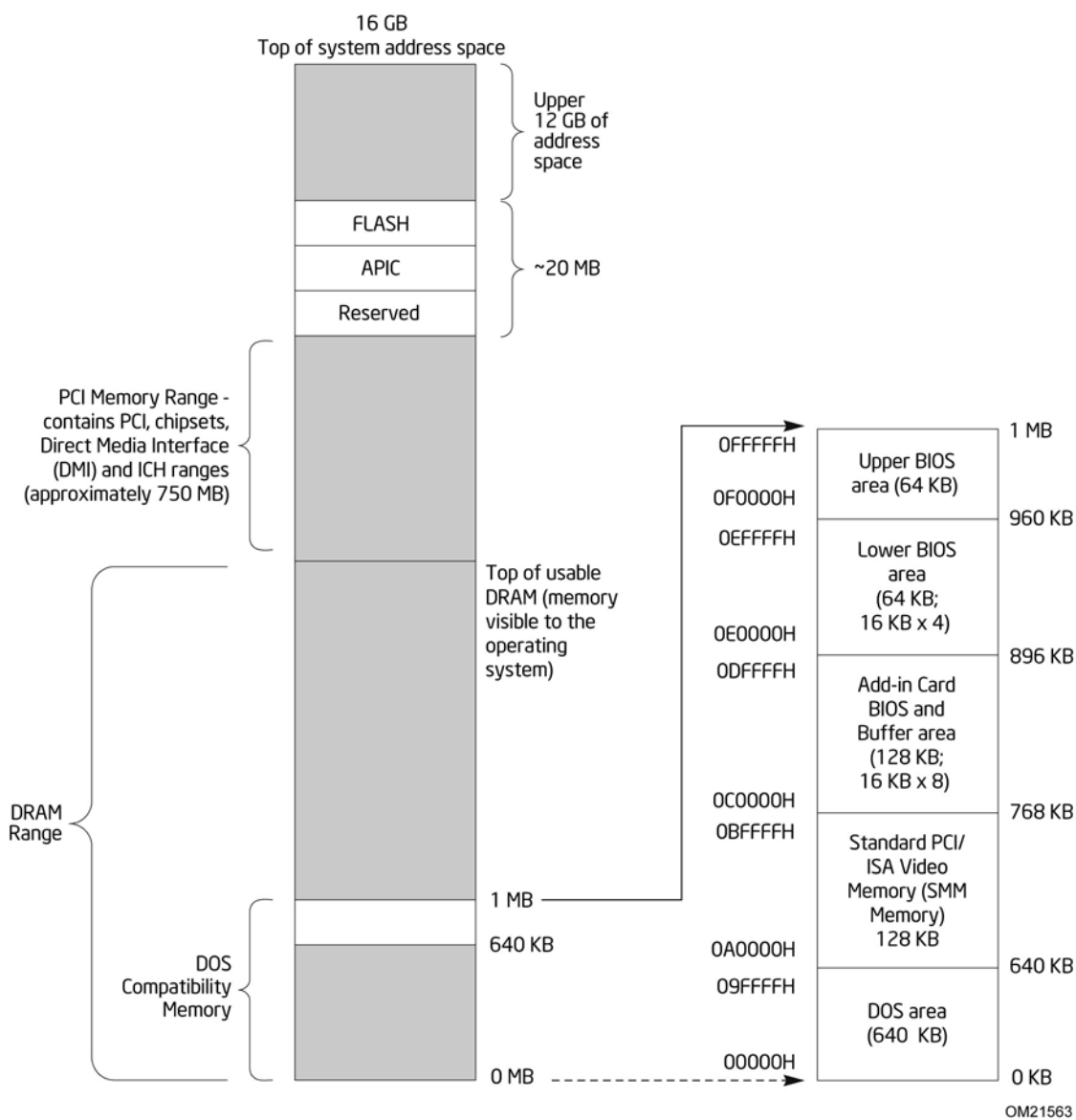


Figure 8. Detailed System Memory Address Map

Table 10 lists the system memory map.

Table 10. System Memory Map

| Address Range (decimal) | Address Range (hex) | Size | Description |
|-------------------------|---------------------|----------|--|
| 1024 K - 16777216 K | 100000 - 3FFFFFFF | 16382 MB | Extended memory |
| 960 K - 1024 K | F0000 - FFFFF | 64 KB | Runtime BIOS |
| 896 K - 960 K | E0000 - EFFFF | 64 KB | Reserved |
| 800 K - 896 K | C8000 - DFFFF | 96 KB | Potential available high DOS memory (open to the PCI Conventional bus). Dependent on video adapter used. |
| 640 K - 800 K | A0000 - C7FFF | 160 KB | Video memory and BIOS |
| 639 K - 640 K | 9FC00 - 9FFFF | 1 KB | Extended BIOS data (movable by memory manager software) |
| 512 K - 639 K | 80000 - 9FBFF | 127 KB | Extended conventional memory |
| 0 K - 512 K | 00000 - 7FFFF | 512 KB | Conventional memory |